The Maine Installer

Dedicated to Professionalism in Underground Tank Installation

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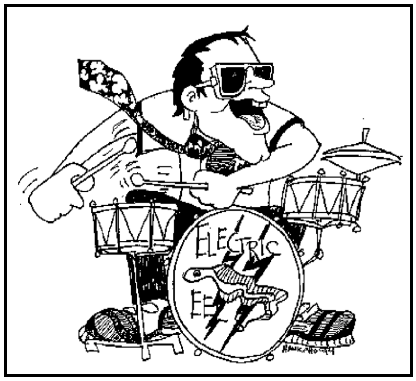
Board Bio: Goodbye Al, Hello Al

Al Prysunka was the last of the original, charter members of the Board of Underground Storage Tank Installers. Unfortunately, we have to say "was" because Al is leaving the Board as well as leaving the Department of Environmental Protection, where he was Director of the Bureau of Hazardous Materials and Solid Waste Control. As charter member, Al was with the Board since the fall of 1986; a long time to be doing this. Thank you Al, and our best wishes go with you.

Alan Michael Prysunka was born on June 21, 1951. He was raised in Johnstown, New York and was his parents only little bundle of joy. Al graduated from Johnstown High School and went on to Union College in Schenectady, New York, where he received a B.A. in American Studies. In 1975, he completed an M.S. degree in Agriculture and Resource Economics at the University of Maine, at Orono.

In November of 1975, Al was hired by the Maine Department of Environmental Protection. His responsibilities included administering and coordinating a Waste Treatment Management Planning Program for the State of Maine. He also developed other, related, water quality planning programs.

In February of 1980, Al was promoted and became the Director of the Division of Water Quality Evaluation and Planning in the Bureau of Water Quality Control. He was charged with preparing EPA water quality grant applications and then administering those federally funded programs. He also established a ground water quality data collection program and a state ground water strategy. Finally, he was responsible for developing and directing programs to achieve state surface water quality standards.



Al Prysunka relaxing

In July of 1982, Al became the Director of the Division of Management Planning. and assumed duties which included, legislative development for the Department and liaison with the legislature, department rule and policy development, procurement of state and federal funds, department program development, and evaluation and intra/ inter agency coordination.

Finally, in February of 1985, Al became the Director of the Bureau of Oil and Hazardous Materials Control, later the Bureau of Hazardous Materials and Solid Waste Control.

While furthering his career at DEP, Al also found time to complete the State and Local Government Program at the JFK School of Government at Harvard University and publish several articles including:

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AST's: A Translation

Last spring, I sent out a letter to you and many of your customers concerning the removal date for the unprotected steel underground piping connected to aboveground oil storage tanks (AST's). As bureacrats we have to write in bureaucratise so here is a quick summary of the language in the statute and the letter.

This law (38 MRSA Sec. 570-K) was intended to place some control on all the underground piping installed at AST "Mom and Pop's," the bulk of which "blossomed" throughout the state after the introduction of Chapter 691 and the UST tank replacement schedule. This is why the "facilities" included are those installed after July 1, 1985. Even though the authors of this law had AST gas stations in mind, it also includes any oil AST except for home heating oil ASTs less than 660 gallons or a combination which equals 1320 gallons.

Single-walled piping that was installed before June 24, 1991 can remain in the ground if it is constructed of cathodically protected steel, fiberglass or other approved noncorrosive material i.e. sleeved copper line and liquid tight double-walled piping. Existing cathodically protected piping must be coated and meet the -0.85 voltage criteria. The bottom line is all bare steel, galvanized and unprotected piping must be removed.

All new underground piping installed at abovegrade AST facilities (except for the home heating oil tank exemption) must have secondary containment with continuous electronic leak detection and installed by a certified installer. The Board of Oil and Solid Fuel is promulgating rules to address the problem with buried or concrete encased copper piping (see the "Backyards and Basement" article in a recent of the "Maine Installer").

The law does not require folks to register installations, however we will keep it on file if you send it in.

W. David McCaskill, Assistant Engineer, Maine Department of Environmental Protection.

Suffering Sump

It seems that every installer in Maine at one time or another has had a problem with water in containment sumps. The early standard sump was designed to simply shed surface water run-off. These designs work well in more benign climates. However, here in the good ole state of Maine, things are a little different. Our combination of high groundwater and /or frozen soil conditions, which trap surface water run-off, ensure that most sumps will be submerged at some time. Water enters the sumps via sump covers, tank to sump connections, piping boots and electrical conduit penetrations. During inspections, the only sumps which have been consistently free of water (not always oil) have been those with liquid tight lids and attached to tank mounted containment collars. Even these sumps will leak if the field gluing is not done properly. This problem has lead one oil company to order the sumps factory installed on the tanks . I have though heard good reports on some of the newer covers found on the tank opening mounted sumps.

So what if the electrical conduit seal-off is sealed, the piping boots are tight and the tank opening connection is snug but water occasionally comes over the top through the cover?

Many installers raise the sump probe off sump floor to allow for a little nuisance water. I've seen probes anywhere between 3 to 14 inches off the sump floor. So how much is too much?

Strict interpretations of Chapter 691 requires that:

> "Interstitial space monitoring shall be able to detect a leak from the primary containment structure of at least 0.2 gallons /hour or 150 gallons within 30 days of a leak or discharge. (Section 5.B.2)"

We don't think that anyone wants to have a sump (and piping) full of gasoline with a leaky top. Gasoline overflows of sumps result in busted up concrete and dirty dirt removal. Presence of gasoline in the sumps, along with the water, may create an explosive hazard. At a minimum , all of the gasoline /water mix that has to be pumped out of the sumps is technically waste oil and should be treated as such.

A reasonable compromise may be positioning the probe 3 inches off the sump floor. If, however, this does not allow enough breathing room between sump pump outs maybe its time to pester the vendor for a permanent fix. Some sumps can and have been retrofitted and even leaky tank opening sump fittings have also been repaired by the manufacturer.

Now what do you do with the water? If the water is contaminated with deisel , fuel oil, kerosene or low levels of gasoline, then its considered waste oil and must be hauled off by a licensed waste oil dealer. Depending on the amount you might be able to decant off, most of the oil can burn in a waste oil burner. Dispose of the rest of the water as waste oil. In the very unlikely event that the facility has a pre treatment agreement with the treatment plant and meets the criteria then it could be sewered . If the water has a floating layer of gasoline then the mixture may be hazardous due to a low flash point and then the only legal option is to handle the mixture as hazardous waste.

The key to this problem is if you can't keep the water out of the sump then keep the oil out of the water. Filter changes, leaky dispenser gaskets (via dispenser sumps and double-walled piping) and submerged pump maintenance is no doubt the source of most of the oil or gas . The installer can help prevent this source of pollution by pumping out the (hopefully clean) sump water prior to any pump and /or dispenser maintenance. During my last series of inspections, I found one site with a sump half full of a diesel /water mixture and another one dry except for a half a quart of diesel left over from a filter change at the dispenser.

To sum it all up, its better to keep the sumps nice and dry from the start and maybe its worth retrofitting the old ones. One installer went as far as replacing all the sumps at a station with liquid tight ones to keep his customer happy. Considering the combined cost of resetting the alarms, dealing with the waste oil, and reducing the fire risk, this may be more cost effective than it sounds at first blush.

We realize that this is a difficult problem so if you have any suggestions please give us a jingle.

We don't think that anyone wants to have a sump (and piping) full of gasoline with a leaky top.

W. David McCaskill, Assistant Engineer, Maine Department of Environmental Protection, Bureau of Hazardous Materials and Solid Waste Control, Division of Technical Services.

Happy Holidays

Cathodic Protection: Questions & Answers

Recently the Department of Environmental Protection's Underground Oil Storage Facility Enforcement Unit sent out a mailing to all owners of cathodically protected underground oil storage facilities with instructions to have their cathodic systems tested yearly. Included in this letter was a logsheet to be made out by a Maine Certified Tank Installer or NACE approved personnel.

We have heard from many installers who have been kept extremely busy testing these systems all over the state. Due to the extremely dry summer, a number of you have run into problems with low results for either the tanks and /or piping. In these cases, re-testing the systems in the fall (when we normally get rainfall) should produce passing results and happier clients.

There have been a number of questions that have been asked regarding these systems. I'll try to cover the ones that have repeatedly come up, in the next few paragraphs. Thanks go to some extremely helpful installers (you know who you are!) for discussing at length some of the unusual test results that have been found in the field. I appreciate the knowledge and theories you shared.

QUESTION: I'm getting lousy readings from the lead lines in the testing port (sump). We've recently had some rain, so the ground isn't dry. Is it time to dig up the anodes and replace them?

ANSWER: Don't dig yet! In a number of these cases, the tanks /piping were installed in the early days of cathodically protected tanks, and the coated wire used for leads was not of the same quality of the wire used for these purposes nowadays. This older wire corrodes more easily (especially if it got nicked during installation) setting up a high resistance, hence the lousy reading.

Another possibility is that the leads have disconnected from the system due to frost /groundwater effects or the leads were never connected to the system to begin with. We suggest testing the tank and piping directly.

If the readings are still lousy, check your surroundings. Is the ground really wet enough? Or has it been cold enough to freeze? Sometimes running a hose and wetting down the tank results in better readings. (However, not all tanks can be wet down this way due to being paved over and having totally contained spill buckets).

It's possible that the system wasn't isolated and has been protecting everything metal in sight, thereby overtaxing the anode. The last possibility is that the bag that covered the anodes during shipping somehow remained in place during installation. Check all possibilities before digging.

QUESTION: I've checked a #2 fuel oil "cp" system and I'm getting worthless readings off the tank. However, when I took a reading off the copper return and suction lines, the numbers were great...what's going on?

ANSWER: Check to see if the piping is isolated from the tank. Copper suction and return lines shouldn't be cathodically protected. However, when a copper feed line is installed in an oil tank it often curves and touches the side of the tank. The tank anode ends up protecting the furnace, the duct work, etc. Make sure that the isolation bushings are in place and haven't been breached. If the bushings are missing, replace them. If the tank is double-walled and has a petrometer air bell probe, in most cases the probe is the problem. The copper lines are in contact with the tank's interstitial space, and again the anode is protecting a lot more than what it was designed to protect.

QUESTION: Now that I've checked everything and found that some repair work is in order, when do I notify the Department that I'll be working on the system?

ANSWER: The Department must be notified in writing 5 business days ahead like any other underground oil storage facility repair /replacement. Call us at 207-287-2651 for the necessary paperwork.

Have any other questions? Call us at DEP. We'll do our best to give you or get you an answer. In the meantime, keep up the good work!

D. M. Fournier, Environmental Specialist, Underground Oil Storage Facility Unit, DEP

Goodbye Al (*Continued from page 1)*

- An Analysis of the Dealer Processor Sector of the Maine Soft-Shell Clam Industry
- The National Pollutant Discharge Elimination System and its Implementation within the Penobscot River Basin
- Current and Potential Day-Use Recreational Activities of Bangor Families and, my favorite,
- Marketing Fresh Vegetables Through Roadside Stands.

On a more personal note, Al lives in Readfield and is married to the lovely Romaine. He has two daughters, Lia (10) and Emma (5). He enjoys canoeing, gardening, making stained glass, and music/ drums.

Allan Ball will be replacing Al Prysunka on the BUSTI as well as in the chair of the director of the Bureau. Allan hails from Lynn, Massachusetts and you'll hear more once your beloved editor can strong-arm him into more information.

Maine Vapor Recovery Regulation Update

Getting from here to there has always been a problem, whether it is paying for a new car; keeping an old car going; or handling the gasoline used to power the cars. Gasoline, not handled carefully, can pollute the water that we drink and *the air that we breath*. Gasoline vapors are a major cause of ozone pollution and can surround us with toxic fumes.

Since 1989, larger gasoline service stations have been required to reduce the emission of gasoline vapors. Beginning on June 1, 1995, smaller stations have had to be equipped with the same devices to reduce the emission of gasoline vapors during deliveries. All stationary gasoline storage tanks have to be equipped with a submerged fill pipe (drop tube). Stations which pump more than 10,000 gallons of gasoline in a month have to be equipped with and use Stage 1 vapor recovery which transfers the vapors in the storage tank into the tank truck during deliveries.

All bulk gasoline plants and tank trucks must be filled by submerged fill. Bulk plants with a daily average throughput greater than 4,000 gallons (calculated on a monthly basis) must use Stage 1 vapor recovery when receiving or loading gasoline.

Every summer day, Stage 1 vapor recovery will prevent over 4 tons of gasoline from becoming an air pollution problem in Maine!

But the Stage 1 requirements and the other controls of volatile organic emissions were not enough to meet the national ozone control requirements. This past July, after a whole lot of debate by the legislature, the requirement for ***Stage 2*** was added to the regulation. Stage 2 captures the gasoline vapors from automobile gas tanks while they are being filled and returns them to the underground tank. The requirement is limited to the largest stations (annual throughput greater than 1 million gallons) in the three southern counties that have the greatest problems with ozone, York, Cumberland, and Sagadahoc. These stations must install and use Stage 2 by November 15, 1996.

This fall and winter, the DEP will be putting together manuals and workshops to provide in-depth instructions on how to comply with the regulations. In the mean time, if you need information on vapor recover equipment and standards, you should try to get information from the Petroleum Equipment Institute.

Commonly Asked Questions About Vapor Recovery

Q If I use a vapor return hose when unloading gasoline into a gasoline tank, why do I have to have a submerged fill? Doesn't the gasoline vapor get transferred to the truck anyway?

This fall and winter, the DEP will be putting together manuals and workshops to provide in-depth instructions on how to comply with the regulations.

A Gasoline is very volatile. It does not take a lot of energy to get it to turn into vapor. Stage 1 is a "balance" system. There has to be a balance between the volume of gasoline being unloaded and the volume of vapor that is captured from the tank. When gasoline is delivered by "splash" fill, the turbulence produces additional gasoline vapors. (A pint of gasoline in a tall, narrow container will evaporate much slower than a pint of gasoline in a shallow pan.) The volume of vapor in the tank plus the vapor generated by the splash fill will be more than the truck can hold. You can see the extra vapor escaping out the tank vent pipe during a splash fill with vapor return hoses.

Q Can I install a vapor return fitting onto a tank vent pipe above ground instead of onto the tank?

A Yes, although the best set up is directly onto the tank for two point systems and underground, fairly close to the tanks for manifold systems. Gasoline vapor is heavier than air and will follow the path of least resistance out of the tank. The tank truck will also create a slight vacuum to draw vapor in during the delivery.

Q If a truck delivers gasoline from a bulk plant which is not required to use vapor return hoses to a service station with a throughput greater than 10,000 gallons per month, must the truck use vapor return hoses during the delivery?

A Yes. Even though Stage 1 vapor recovery is not required at the bulk gasoline plant that supplies the station, there is an environmental benefit when the delivery truck uses vapor recovery. Tank trucks always contain gasoline vapors, even when they load and unload without Stage 1 vapor control. Gasoline evaporates from the wet walls inside the empty truck. When the truck is filled at the bulk plant without vapor return hoses, these vapors are sent into the air. When the truck unloads at the service station using Stage 1 vapor return hoses, the saturated vapor in the station tanks will fill the space in the delivery truck's tank. This will prevent the gasoline that remains in the truck tank from evaporating into the empty space. When vapor recovery is used at both the service station and the bulk plant, vapor emissions are reduced by about 90%. With vapor control only at the service station, vapor emission is reduced by about 40%.

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Offset Fill Lines

Many if not all of your customers request offset fill lines for home or commercial UST heating oil tanks. At businesses this eliminates the need to plow the tank area. At homes, tight-fill above grade risers simplify deliveries. In the past the department has allowed single-walled horizontal runs on offset fill lines. However, this was a mistake.

Any crack or hole in the offset fill line would leak oil during each pressure delivery and would remain undetected. Chapter 691 states in Section 6B(2) under leak detection for heating oil tanks "...All new and replacement facilities shall be designed to provide secondary containment for all facility components routinely containing product, including tanks, product piping and below ground ancillary equipment. New and replacement tanks and product piping shall have continuous interstitial space monitoring." It is the Department's current interpretation that off-set fill lines routinely hold product and therefore **all newly installed** offset fill lines should have secondary containment and continuous interstitial space monitoring. One such pressure fill line leak at a AST site has cost the department over 600,000 dollars.

The most bombproof way of accomplishing this new policy would be to terminate the double-walled offset fill line in the same piping sump used for the suction and return lines. This way only one monitoring probe would be needed as opposed to a separate sump for the offset fill line. Equipment wise this means using tanks with multi-fitting manways and a factory mounted containment ring. The sump could be bolted or glued onto the containment ring depending on the manufacturers design.

Of course, all this adds to the cost of a home heating oil UST installation but the benefits are greater environmental (not to mention real estate) protection and peace of mind.

Training Update

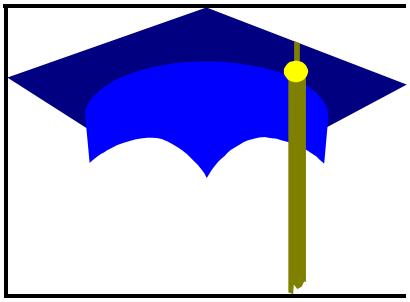
Two (2) installers applied for and received two hours credit each for factory oversight of their installations of Advanced Polymer Tech (APT) Piping. The Board granted two (2) hours credit each to eight (8) installers who attended seminars sponsored by the Maine Department of Environmental Protection (DEP) and designed to educate tank owners and operators in their monitoring requirements.

One installer applied for and received two (2) hours credit for an Occupational Safety and Health Administration (OSHA) refresher offered by Safety Communications Corp. While Safety Communications has not directly applied for program credit themselves, several installers periodically attend their courses and gain credit from their efforts. The address of Safety Communications is117 Allen Road, Presque Isle, ME 04769. The telephone is207 //762-3481 .

A tank installer's seminar entitled "Securing the Future of Installer's Business," and sponsored by the Maine Oil Dealer's Association (MODA) was held in Augusta on October24. The Board granted two hours credit to all installers who attended. We understand MODA is planning another tank installer's seminar for early in1 996. Stay tuned.

The firm of Field Services, Inc. (995 Forest Avenue, Portland, ME 041 03; telephone207 /878-9070) applied for and was granted eight (8) hours credit for their 40 hour OSHA course, and two (2) hours credit for their annual refresher. The accreditation is valid for a one year period beginning October24,1 995. The Board also granted two (2) hours credit to several individual installers who applied as having taken the Field Services course in1 994 and earlier in1 995.

The Maine Safety Council (MSC) offers a number of courses on a routine basis. Right now, "Basic First Aid and CPR" will be held in South Portland on December12 and in Brewer on December1 4. "Spill Reporting" will be held on December 5 in Portland and December 7 in Brewer. Although neither of the courses has received Board accreditation at this time, installers are encouraged to apply for credit themselves for any offering they feel is relevant to underground tank installation. MSC's address is 75 Darling Ave., South



Portland, ME 041 06. Their telephone is207/772-0506.

Renewing Your Certificate; a Primer

We hopefully enclosed or will enclose a recertification form with the first reminder that your certificate was nearing expiration. If you get that form filled out and in to us before your certificate expires, with the appropriate certification fee, we can process your renewal application. We can still process your renewal application if we receive it within thirty (30) days after your certificate expires if you enclose an additional $1 0 late fee in addition to your certification.

After that thirty day grace period, renewal is not possible but reinstatement is. The difference between renewal and reinstatement is that reinstatement means you've got to come to a Board meaning, explain why you were late with the form , and convince the Board that you still are competent to be an installer. This can be inconvenient, embarrassing, time-consuming, and costly; but it is possible to get your certificate back if you apply for reinstatement within two (2) years after your certificate expires.

In addition to just plain forgetting, the biggest reason we hear for folks not re-certifying is they don't have the necessary continuing education credits (8 credit hours since when you were last certified). They are holding onto the form until they get

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Enforcement Update

One installer decided to settle various complaints regarding an installation completed at a marketing and distribution facility in 1989 by means of a Consent Agreement. The Consent Agreement provided for a $1,050 civil penalty for a variety of violations, including (1) the registration materials for the facility were substantively different than what was actually installed (one compartmentalized double-walled tank was registered, three single-walled tanks were actually installed), (2) the cathodically protected steel tanks were purposely electrically connected to flexible connectors for the piping and thus violated manufacturer's requirements for electrical isolation, (3) bare, unprotected steel used in fill and vapor recovery risers as well as overfill buckets were not coated to increase corrosion resistance, and (4) two brands of fiberglass piping were joined with simple glued joints in a section of vent piping, in violation of manufacturer's installation instructions. Two additional allegations were dismissed because of insufficient evidence.

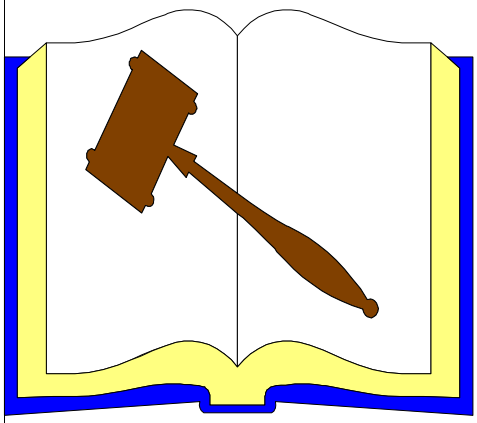
A second installer used an inappropriate form of continuous electronic monitoring for the underground piping associated with an above ground tank installation. The installer decided to settle the matter with a Consent Agreement involving a $250 civil penalty.

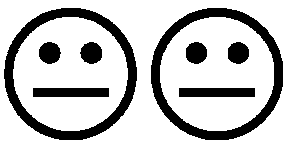
A third installer settled a complaint of installing an unregistered facility with a Consent Agreement that included a $250 civil penalty. An apprentice paid a $75 civil penalty in order that three apprentice installation verification forms that were submitted late (more than 45 days after completion of the installation) could be counted towards completion of the apprenticeship. Three installers agreed to probation's and, in some cases, civil penalties because they allowed their certificates to lapse without completing the Board's required eight (8) credit hours of continuing education.

The Board dealt with and dismissed three other cases of alleged installations with allegedly nonexistent registrations and /or certificates of proper installations. In one case, whereby the installer immediately resolved the deficiency, the Board dropped the case with an informal warning. The Board dismissed the two other cases because the installers were able to demonstrate registration materials actually had been submitted.

One allegation of improperly sloped vent piping was dismissed when the Board determined the slope was due to a sag in the piping rather than improper slope that was originally installed. While the Board had concerns over whether or not this was really due to improper backfill compacting, sufficient evidence could not be established.

While the Board dismissed action in one case involving complaints of improper discharge of gasoline and failure to report evidence of a leak because of insufficient evidence, it informed the installer of the seriousness of those allegations.





Renew *(Continued from page 5)*

sufficient continuing education.

Big, big, very big, massive mistake. We will have to deal with the continuing education issue anyway (probably through a consent agreement with a probation and a civil penalty). However, if your renewal form is not in, we can do nothing except listen to the clock tick until you and your certificate are out on your ears. Then we've got two issues (no education, no renewal) that we have to deal with, not just the one of no education.

To add insult to injury, there's no way to give breaks on this process. The certificate renewal /expiration process is spelled out directly in the law, passed by the Legislature and signed by the Governor, which establishes the Board. We can only implement the law; we can't change it.

TRENCHING, SHORING, AND UST'S

OSHA's Excavations Standards Must Be Met During Underground Storage Tank Excavation Work

After a four-man crew had removed an underground filter tank at a car-wash construction site, they entered the 9-foot deep, 6-foot by 14-foot excavation to hand grade the bottom. The sides of the excavation were neither shored nor sloped. A wall of the trench collapsed, killing one worker and seriously injuring another. The employer was in clear violation of the OSHA standards that cover excavations (29 CFR Subpart P, sections 650-652).

EXCAVATION CAVE-INS ARE REAL hazards that happen all too often, and underground storage tank (UST) installation and removal operations are no exception. Bureau of Labor Statistics (BLS) for 1993 state that 138 workers were killed by collapsing materials. That figure represents 2 percent of all work-related fatalities that were caused by injury in that year.

Yet, there is no shortage of stories about employers who go to great lengths to avoid having to comply with these important OSHA requirements, which clearly saves lives. (Did you hear the one about the tank installer who was found installing tanks at 3:00 am to avoid the OSHA inspectors?) The safety requirements for excavations are not unduly burdensome regulations that have no real life impact on workers; these requirements save lives ... everyday.

Are these requirements that tough to meet? Just imagine if you'd been the foreman on the car-wash job described above, and the onus was on you to inform the worker's spouse and children that their loved one was crushed to death at work today. And more often than not, the loved one does have dependent children-BLS reports that 66 percent of workers killed on the job are less than 45 years of age. Considering these potentially tragic consequences, compliance with the OSHA requirements seems the smart thing to do.

OSHA Requirements For Excavations

The 29 CFR 1926.651 *General Requirements for excavations* are laid out in paragraph form and include the following subsections:

(a) Surface encumbrances.

According to the standard, "All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees." When trenches are dug alongside of buildings or fixed objects, the weight of the building on the side of the trench may cause the trench wall to collapse. This type of situation can be especially true in the tight areas associated with remediations.

For example: *During a pipe laying operation, a tree adjacent to the excavation was undercut at the roots, 3 feet below ground level. The tree fell and when it did, it pinned a worker against the pipe that was being laid at the bottom of the trench.*

(b) Underground installations.

According to the standard, "The estimated location of utility installations-such as sewer, telephone, fuel electric, or water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work-shall be determined prior to opening an excavation."

Clearly, the potential of striking an underground electrical or fuel line needs to be addressed before an excavation is begun. Usually utilities companies can be contacted directly and are very responsive to requests for review of a planned excavation. Potential hazard also lurks in a situation where a trench intersects an area of previously disturbed soils. Many fatalities associated with trenching accidents have occurred at the intersection of a trench and a previously filled trench (e.g., a utility conduit). For example: *A trench, 10.5 feet long, had been dug in preparation for laying a sewer pipe. A gas main was located 4 feet to the east of the trench. As the worker was grading the bottom of the trench, the east wall collapsed. The worker was crushed to death. The section that fell consisted of fill material from the previous installation of the gas main.*

(c) Access and egress.

This paragraph requires that adequate consideration be given to access and egress into and out of the trench and brings to mind the children's story of Mike Mulligan and his steam shovel, Mary Ann. Taking up a challenge to dig the basement of Popperville's city hall in one day, they worked so fast and furiously that they forgot to dig themselves a way out. Fortunately for Mike and Mary Ann, things worked out fine-Mike was hired on as maintenance man at the new town hall, and Mary Ann was transformed into the town hall boiler.

In the real world, however, getting out of an excavation can be quite hazardous. The very act of scaling a vertical wall can cause it to collapse. Consequently, OSHA requires that either ramps and runways, designed by a "competent person", or stairways or ladders be included in all excavations. A competent person is defined by OSHA as an individual who is "capable of identifying existing and predictable hazards or working conditions that are hazardous, unsanitary, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate or control these hazards and conditions." (Note: OSHA published an "intent" of its definition of a competent person in the 10/31/89 *Federal Register*. It states that a competent person must have specific training in and be knowledgeable about soil analysis, the use of protective systems, and the requirements of the standards.) A means of egress is also required for all excavations greater than 4 feet deep and must be placed in such a manner so as to require no more than 25 feet of lateral travel distance for employees.

(d) Exposure to vehicular traffic.

UST operations often take place at gas stations, where vehicular traffic can be a real hazard. In 1993, 361 workers died as a result of being struck by vehicles-6 percent of occupational fatalities for that year. Because trenching operations often take place adjacent to or in roadways, OSHA requires that workers exposed to vehicular traffic be provided with warning vests or other suitable garments marked with or made of reflective or high visibility material.

(e) Exposure to falling loads.

There are many examples of workers in trenches being crushed by falling loads. Workers must not be permitted underneath loads that are being handled by lifting or digging equipment. For example, when a tank is being lifted out of an excavation, workers must be restricted from entering the tank excavation or drop zone.

(f) Warning system for mobile equipment.

Because construction equipment operators are often unable to see everything that is going on to their rear during operations, a general practice of construction safety is to equip all heavy equipment that is used on site with backup alarms. When working from the surface into an excavation, these operators are also very limited in terms of what they can see in the excavation. Consequently, where mobile equipment is used adjacent to an excavation where the operator does not have a clear and direct view of the edge of the trench, OSHA requires a warning system, such as barricades, hand or mechanical signals, or stop logs, to be utilized.

For example: *A sewer pipe was being laid in an 8-foot deep trench. One end of the trench was being back filled by a front end loader. A worker, new to the job, entered the area of the trench that was being backfilled and was crushed to death when a load of fill was dropped on him. The other workers in the area did not realize the worker was missing until several minutes had passed. Only after searching did they determine that their coworker must have been buried in the*

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backfilled area. The operator of the front end loader, who's view of the excavation was obscured, had no idea that he had buried his coworker.

(g) Hazardous atmospheres.

Hazardous atmospheres can be a problem in trenches. Because of the nature of a trench (i.e., because a trench is a narrow depression in the earth) hazardous gases may accumulate as they are released from the soil or groundwater. This potential for concentrations of gases is particularly true at hazardous waste sites and may pose a problem at UST remediation sites where the tank has leaked. If there is the potential for a hazardous atmosphere to exist in a trench greater than 4 feet deep, OSHA requires atmospheric testing of the trench before employees are allowed to enter -- oxygen levels must be greater than 19.5 percent, the atmosphere must not exceed 20 percent of any lower explosion limit (LEL), and toxics below the permissible exposure limit (PEL). Hazardous atmospheres and entry into confined spaces, such as trenches greater than 4 feet, can be extremely hazardous. For this reason, if an UST removal operation is being performed in contaminated soil where the potential exists for hazardous atmospheres, a competent safety professional should be consulted.

For example: *An UST was removed from an excavation approximately 6.5 feet wide and 6 feet deep. There was approximately one foot of water at the bottom of the excavation. In preparation for installation of the new tank, two workers entered the excavation to splice two pipes. Unbeknownst to the entrants, propane gas had leaked from an underwater joint on the pressurized side of the pipe being spliced. Both workers were killed by asphyxiation.*

(h) Protection from hazards associated with water accumulation.

OSHA requires employers to adequately protect workers from the hazards associated with water accumulation in an excavation. OSHA outlines three strategies for doing so, including shield systems, removal of accumulated water, or use of a safety harness and life line. Heavy rainfall or water accumulation from groundwater seepage is often associated with trench collapse. Particular care should be taken when inspecting trenches with water accumulation.

(i) Stability of adjacent structures.

This paragraph of the standard requires that proper precautions be taken when the stability of an adjacent structure is jeopardized by the excavation. Support systems must be designed by a competent person, or a professional engineer must certify that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity. The standard also states that if sidewalks and pavements will be undermined, there must be an appropriate support system to protect employees from the possible collapse of such structures.

(j) Protection of employees from loose rock or soil.

OSHA requires that employees be afforded adequate protection from the hazard of loose rock or soil falling or rolling from the face of an excavation. Specifically, OSHA requires that all materials and equipment be kept at least two feet from the edge of an excavation.

(k) Inspections.

OSHA requires that daily inspections be performed to identify evidence of situations that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, and other hazardous conditions. These inspections must be performed by a "competent person."

(1) Fall protection.

Where a falling hazard exists, an employer must mitigate the hazard. Because trenches and excavations may pose a fall hazard, employers are required to provide physical barriers to prevent inadvertent entry. The standard requires:

Walkways or bridges with standard guardrails where employees or equipment have to cross over an excavation.

"Adequate barrier physical protection" at all remotely located excavations.

Wells, pits, shafts, etc. must be barricaded or covered. Temporary wells, pits, shafts, etc. must be backfilled upon completion of exploration operations.

OSHA Requirements For Sloping And Shoring

The following section, 29 CFR 1926.652, *Requirements for protective systems*, describes how employees who must enter excavations are to be protected. There are essentially two options to ensure the safety of workers who enter excavations: Sloping or shoring.

Proper sloping of trenches is described in paragraph (b) design of sloping and benching systems. Employers have four options for proper compliance:

Option I - requires a slope of 1 and 1/2 horizontal to 1 vertical for a slope of 34 degrees measured from the horizontal. This requires that the slope be cut back 1 and 1/2 foot from the trench for every foot of depth. A 6-foot trench, therefore, would require a slope 9 feet out from the base of the slope.

Option 2 - allows for steeper slopes, based on the type of soil in which the excavation will be dug. For an in-depth discussion of soil types and required slopes see 29 CFR 1926.652 Appendix A, *Soil Classification*, and Appendix B, *Sloping and Benching*. There are essentially four types of soils: Stable rock, type A, type B, and type C. The angle of sloping in Option 1 assumes a type C soil. By definition, UST remediation work cannot possibly be done in type A soil, because type A soil, as defined by the standard, must never have been previously disturbed. Soil around a tank removal operation has obviously been previously disturbed (i.e., when the tank was installed). Type B soil requires a slope of 1 horizontal unit to one vertical for a slope of 45 degrees. It is probably easiest to simply dispense with the process of classifying soil and to assume it is type C, which requires a slope of 1.5 to 1.

Option 3 - requires the use of tabulated data approved by a registered professional engineer.

Option 4 - requires sloping systems designed and approved by a registered professional engineer.

The requirements for shoring systems are found in paragraph (c) *Design of support systems, shield systems and other protective systems.* As with sloping, there are several options for using acceptable shoring devices, including systems which meet the requirements of Appendices A, C, and D of the standard; systems which are used in accordance with the specifications, limitations, and recommendations issued or made by the

(Continued on page 9)

(Continued from page 8)

manufacturer; systems based on tabulated data approved by a registered professional engineer; or systems designed by a professional engineer. Protective systems which meet the intent of the standard are discussed in some detail in Appendix C, *Timber Shoring for Trenches*, and Appendix D, *Aluminum Hydraulic Shoring for Trenches*.

Staying Out of Harm's Way

In 1985 OSHA prepared a report entitled, *Selected Occupational Fatalities Related to Trenching and Excavation as Found in OSHA Fatality /Catastrophe Investigations*, which was a review of some 206 trenching and shoring fatalities. The conclusion listed several recurrent problem areas, including:

- Failure to provide adequate support systems (shoring);
- Failure to set excavated material back an adequate distance (required 2-foot minimum) from the edge of the excavation;
- Inadequate sloping of trench walls;
- Causing equipment and vehicles to come into contact with sources of electrical current;
- Operating equipment and vehicles too close to the edge of the excavation;
- Failure of workers to communicate in such a way as to prevent coworkers from being struck by equipment; and
- Failure to properly brace standing walls adjacent to trenches.

OSHA went on to list secondary causes of fatal accidents. These included:

- Inexperienced workers or workers new to a particular job;
- Employees taking unnecessary personal risks;
- Dangerous work practices (e.g., shortcuts that increase the likelihood of an accident);
- Failure to coordinate work in small areas; and
- Health problems relating to the physical condition of workers (e.g., alcohol).

OSHA concludes the report by listing several sets of measures which can be taken to prevent the complex events that are a function of human, machine, and environmental interactions that too often result in fatal trenching accidents. These preventative measures include:

- Establishing and strictly enforcing trenching and excavation safety measures, such as shoring, sloping, and removal of spoil from the edge of the excavation;
- Increasing training and education for work safety procedures and activities; and
- Improving supervision over required safety measures.

Excavations associated with UST installation and remediation are by their nature dangerous, and no worker should be expected to enter a trench without the proper protection. Yet as hazardous as such work may be, there are some very effective strategies for protecting workers. A good place to start is by complying with the OSHA regulations.

References:

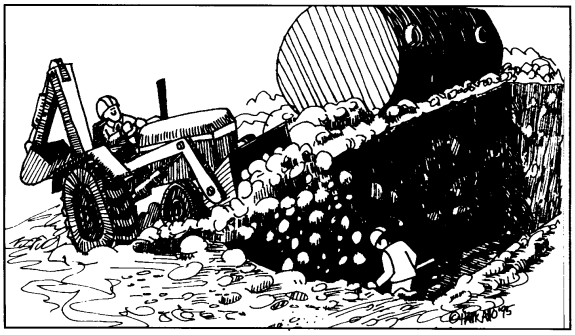
OSHA, 29 CFR Part 1926 Occupational Safety and Health Standards- Excavations; Final Rule. *Federal Register*, Tuesday October 31, 1989.

OSHA, Selected Occupational Fatalities Related to Trenching and Excavation as Found in OSHA Fatality/-Catastrophe Investigations. July 1985.

OSHA, Accident Report - Fatal Facts Number 52.

Bureau of Labor Statistics. *National Census of Fatal Occupational Injuries.* August 1994.

Matthew Fitzgerald, DrPH, CIH, Senior Industrial hygienist with SCIENTECH Inc. in Rockville, MD. He is currently working on safety and health policy issues concerning the Department of Energy's mammoth effort to clean up the nuclear weapons complex and restore the environment. Matthew has written three other health and safety articles for Lustline. This article was reprinted with permission from Bulletin 22 of Lustline, June, 1995.



What's wrong with this picture?

Stalking the Elusive 0.85 Volts -- Monitoring Cathodic Protection

(Ed. note -- Although this article is rather dated, it provides detailed information that augments the previous DEP staff article on cathodic protection monitoring. Apologies to Marcel Moreau, who wrote the original article -- it had to be severely edited to fit in this space.)

Cathodic protection must be monitored over time to ensure that the system is, indeed, being protected against corrosion. Ideally, it should all begin with the installation of the system. The most commonly accepted criteria in the corrosion industry for verifying cathodic protection is a structure to electrolyte potential of -0.85 volts relative to a copper/copper sulphate reference cell.

There are two and only two essential requirements for ease of cathodic protection monitoring. These are:

(1) Have an easy way to get an electrical connection with the tank or pipe from the ground surface, and

(2) Have an easy way to get the copper/copper sulfate cell into contact with soil

Both of these requirements can most easily be met be installing a cathodic protection test station at the time of construction of the system. It is simply a hole with an easily removable cover which penetrates any pavement and allows access to the soil beneath. It is also a convenient place to bring the monitoring wire from the structure underneath.

Ideally, the test station for the tank should be located over the centerline and near the middle of the tank. This is the point where the tank is nearest to the ground surface and is the most distant point from the tank anodes, which are usually located on the tank ends.

Test stations for piping runs should be located close to the piping, but away from the anodes that are protecting the pipe. Test stations for piping are convenient, but not so important as for tanks because piping usually comes above ground at some point and is directly accessible. Soil is usually accessible underneath dispensers or around submerged pumps. Since these areas are at the end of the piping run, they are likely to be the furthest from piping anodes, which should be located near the middle of the piping run. Thus, these areas are good locations for verifying the performance of that piping run.

Most systems will meet the 0.85 volt criteria for protection very soon after installation, if a very simple step is taken: dampen the anode with 5 gallons or so of water when backfilling. If backfill is extremely dry, running a lawn sprinkler overnight at the location should provide sufficient moisture to get a reading.

If the anodes are unwrapped and solidly attached, the coating is intact, and electrical isolation is maintained; cathodic protection systems should be relatively trouble free. Where trouble is most likely to occur for both tanks and piping is through the loss of electrical isolation, such as:

* Electrical grounding from the inside of the tank. This could result from a submerged pump which is installed too low in the tank and touches the bottom, or if the metallic tube (especially in heating oil tanks) touches the bottom of the tank.
* Failure to install or bridging of electrical isolation fittings at either end of piping runs.
* Accidental contact of piping on tank with electrical conduit, water pipe or other buried metallic pipng where they cross underground.
* Contact of the aboveground portion of vent piping with metallic structure like canopies or tin roofs or gutters which may in turn be connected to an electrical ground.

Cathodic protection monitoring difficulties can also result from other causes, including:

* A broken monitoring wire. This can be checked by attaching a wire to a metal tack, driving it into the bottom of a dip stick, and lowering it to the bottom of the tank. It may be necessary to penetrate some sludge or mill scale on the bottom of the tank to obtain a good electrical connection with the tank.
* If you are placing the reference electrode around a fill pipe or a submerged pump, check to see if the soil is saturated with petroleum.
* You will get readings, though probably not accurate ones, with the reference electrode in contact with concrete or asphalt. Also be wary of readings taken when soil is frozen.

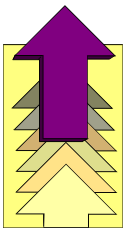
If you are not able to get the 0.85 volts reading, even after you correct any of the problems listed here, you could contact a qualified corrosion expert to help in stalking those elusive volts.

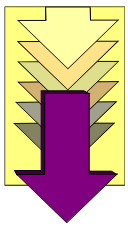
(Excerpted and edited from LUSTLine Bulletin 8, May 1988)

Vapor Recovery *(Continued from page 4)*

If you have additional questions about gasoline vapor recovery, put them on a post card and send them to:

Louis Fontaine
Bureau of Air Quality Control
Department of Environmental Protection
17 State House Station
Augusta, ME 04333-0017





Obituary -- John N. Fitzpatrick

John N. Fitzpatrick, 52, licensed tank installer, passed away on June 9, 1995, after a brief illness. He had worked for A.L. Doggett, Inc. of Gray as a foreman and heavy equipment operator since the late 1980's. John was a very conscientious, hard worker who cared deeply about proper installations and regulations in the tank industry. John is survived by his wife Phyllis and daughter Tannette. He will be deeply missed.

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